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FRANKFORD ARSENAL

TEST REPORT

REPORT NO. T54-13-1

FC



EXAMINATION AND EVALUATION OF FOREIGN FIRE CONTROL INSTRUMENTS

GERMAN PERISCOPE TYPE PVE 8B-1

by P. R. Yoder, Jr.

Ord. Proj. TEL-1055D
DA Proj. 513-01-006

Fire Control Instrument Group

FRANKFORD ARSENAL
PHILADELPHIA, PA.

28 Dec 1954

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Ground Weapons Division
Research and Development Department
Fire Control Instrument Group
Frankford Arsenal
Philadelphia 37, Pa.

Test Report T54-13-1
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EXAMINATION AND EVALUATION OF FOREIGN FIRE CONTROL INSTRUMENTS

GERMAN PERISCOPE TYPE PVE 8B-1

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ABSTRACT

The purpose of this test was to examine and evaluate the German Periscope, Type PVE 8B-1.

The important optical and mechanical features of this periscope were listed. The approximately 43° field of view could be adjusted through 360° in azimuth, and from -30° to $+135^\circ$ in elevation. The magnification provided was about 1.8 power. The image quality was not so good as expected.

The reticle, which was projected into the field of view, could be moved horizontally and/or vertically by a complex mechanism involving handmade three-dimensional cams.

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BACKGROUND

A German Periscope, Type PVE 8B-1, which is believed to have been used during World War II for observation and gun sighting from an aircraft, was obtained through the courtesy of the National Bureau of Standards, Washington, D. C., for examination and evaluation. This report summarizes the important optical and mechanical features of the instrument.

DISCUSSION

The instrument (see Figures 1 and 2) is essentially a periscopic type of sight with a movable head prism to permit the line of sight to be rotated through 360° in azimuth, and depressed or elevated from -30° to $+135^{\circ}$ referenced to the horizontal, at any azimuth setting. Movement of the line of sight in azimuth and elevation is accomplished through linkages to an external control unit. Observations are made through a spherical glass dome of excellent optical quality containing the head prism mechanism.

The optical system (see Figures 3 and 4) provides a true field of view of approximately 43° at a magnification of approximately 1.8 power and with a clear eye distance of about 1.0 inches. The eyepiece design used is a "wide-angle" type, characteristic of instruments having a large apparent field of view.

The reticle of this instrument is illuminated by an incandescent lamp and is viewed through an auxiliary microscope system superimposed upon the target through a beam-combining ocular prism assembly. The reticle pattern is a pair of crossed lines with a circle at the center (see Item 1 of Figure 7). A neutral density optical filter is provided, which may be inserted into the field of view by moving a filter control lever.

The optical image quality of the instrument examined was not so good as expected for this type optical system. The image definition was good only within about 6° of the center of the field of view. It could not be determined positively whether this condition was inherent in the optical design or caused by some hidden defect (or mis-alignment) within the system.

Details of the mounting of the optical components and the complex mechanism used to move the reticle horizontally and vertically are illustrated in Figures 5, 6, and 7. The reticle mechanism permits ballistic data to be fed into the instrument by positioning the control knob (see Item 3 of Figure 1). The three-dimensional cams are of particular interest since they appear to have been handmade to close tolerances.

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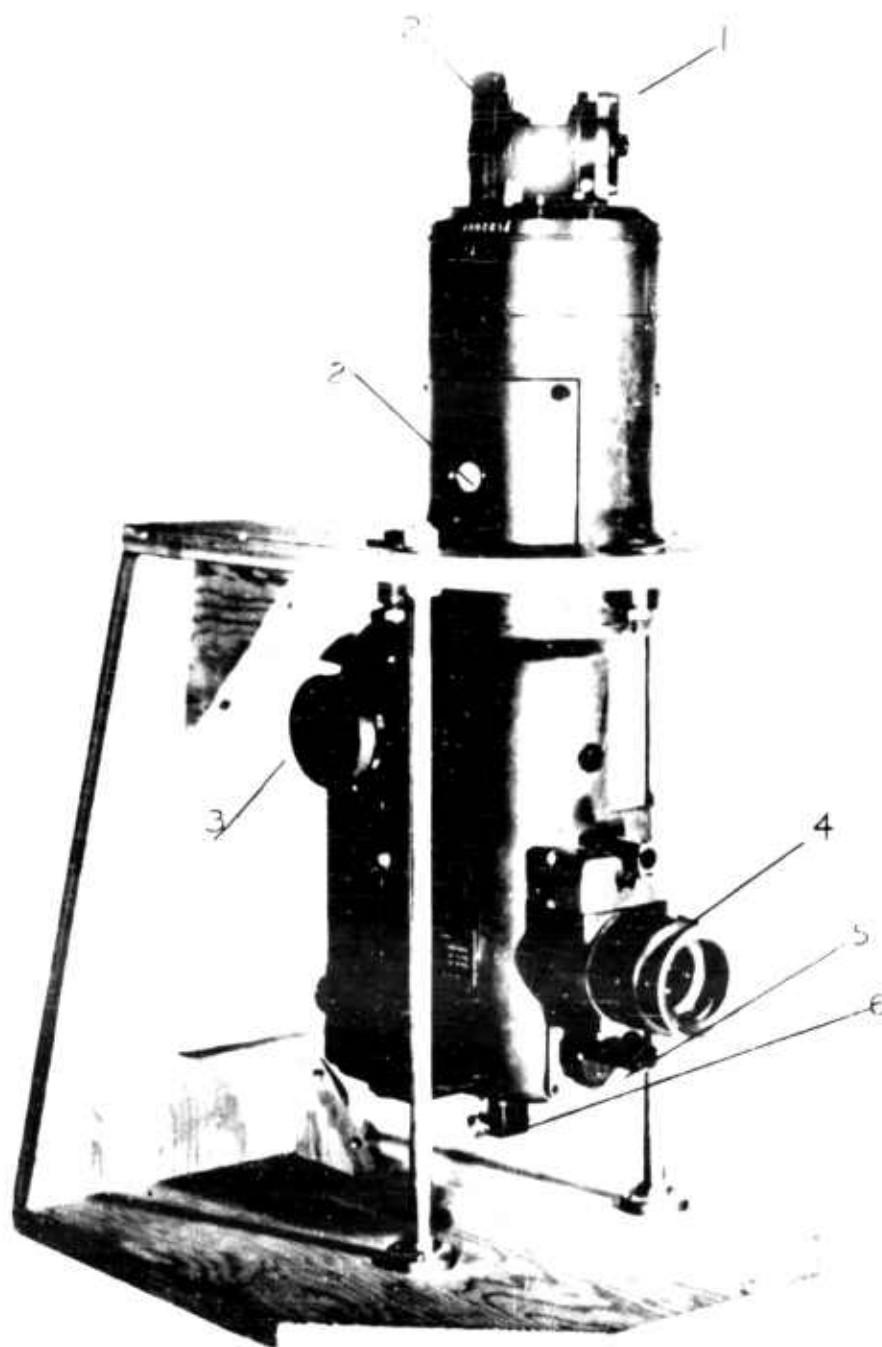


Figure 1. Front View of Periscope

- | | |
|-----------------|--------------------------|
| 1. Dome | 4. Eyepiece |
| 2. Dessicators | 5. Rheostat |
| 3. Control Knob | 6. Electrical Connection |

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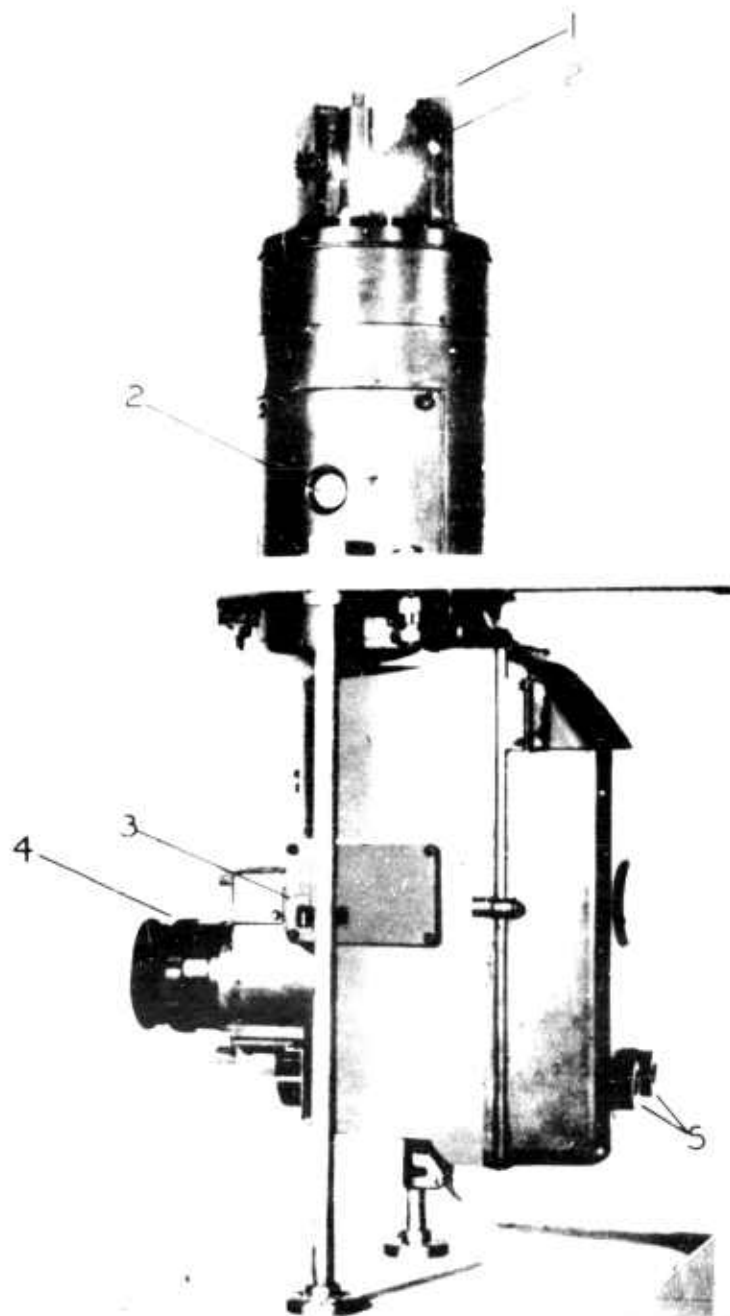


Figure 2. Side View of Periscope

- | | |
|-------------------|-----------------------------|
| 1. Dome | 4. Eyepiece |
| 2. Dessicators | 5. Sockets for Azimuth and |
| 3. Filter Control | Elevation Control Linkages. |

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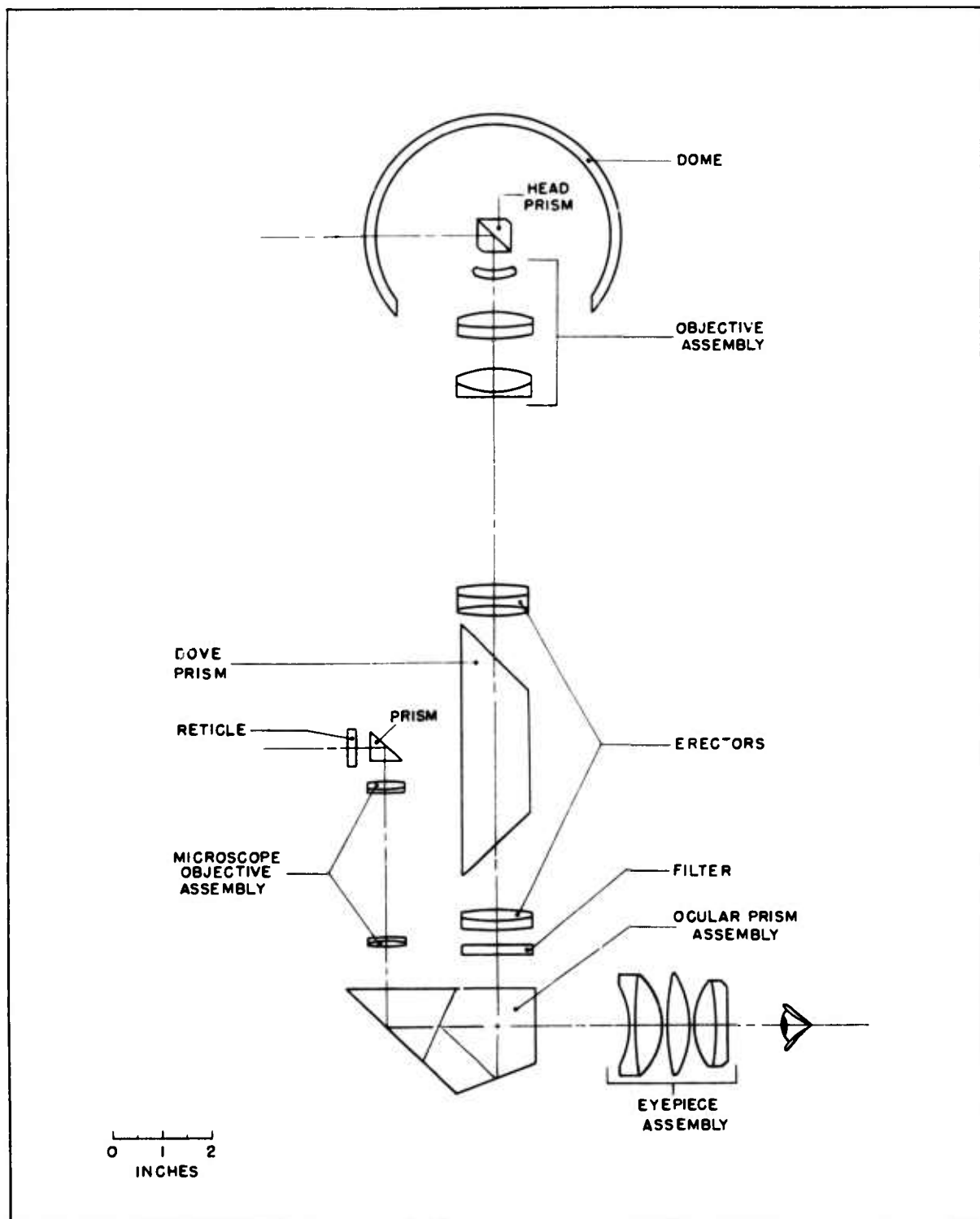


Figure 3. Schematic View of Optical System

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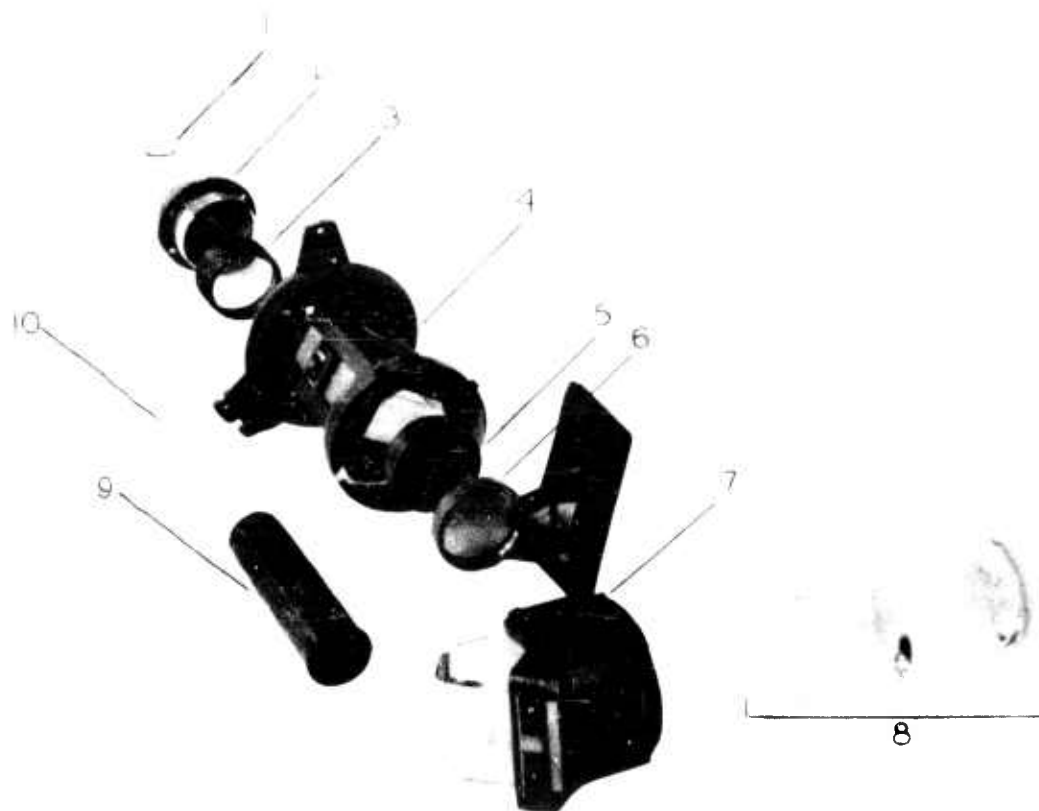


Figure 4. Exploded View of Optical System

- | | |
|------------------------|----------------------------------|
| 1. Head Prism | 6. Filter Assembly |
| 2. Objective Assembly | 7. Ocular Prism Assembly |
| 3. First Erector Lens | 8. Eyepiece |
| 4. Dove Prism Assembly | 9. Microscope Objective Assembly |
| 5. Second Erector Lens | 10. Prism |

Reticle not shown

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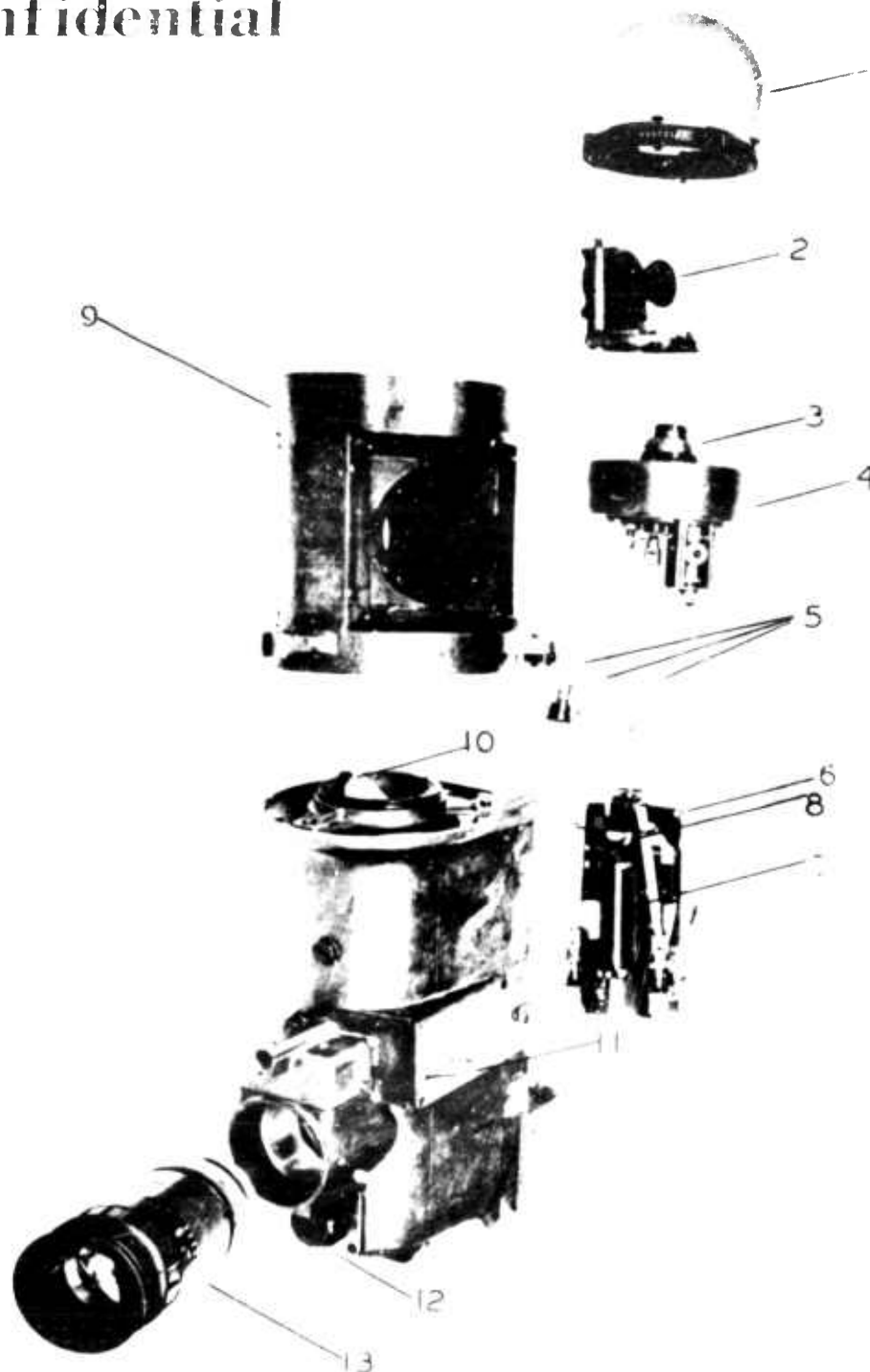


Figure 5. Exploded View (Front)

- | | |
|----------------------------------|-----------------------|
| 1. Dome | 8. Prism |
| 2. Head Prism | 9. Housing |
| 3. Objective Assembly | 10. Dove Prism |
| 4. Gear Housing | 11. Filter Control |
| 5. Linkages | 12. Rheostat |
| 6. Reticle Mechanism | 13. Eyepiece Assembly |
| 7. Microscope Objective Assembly | |

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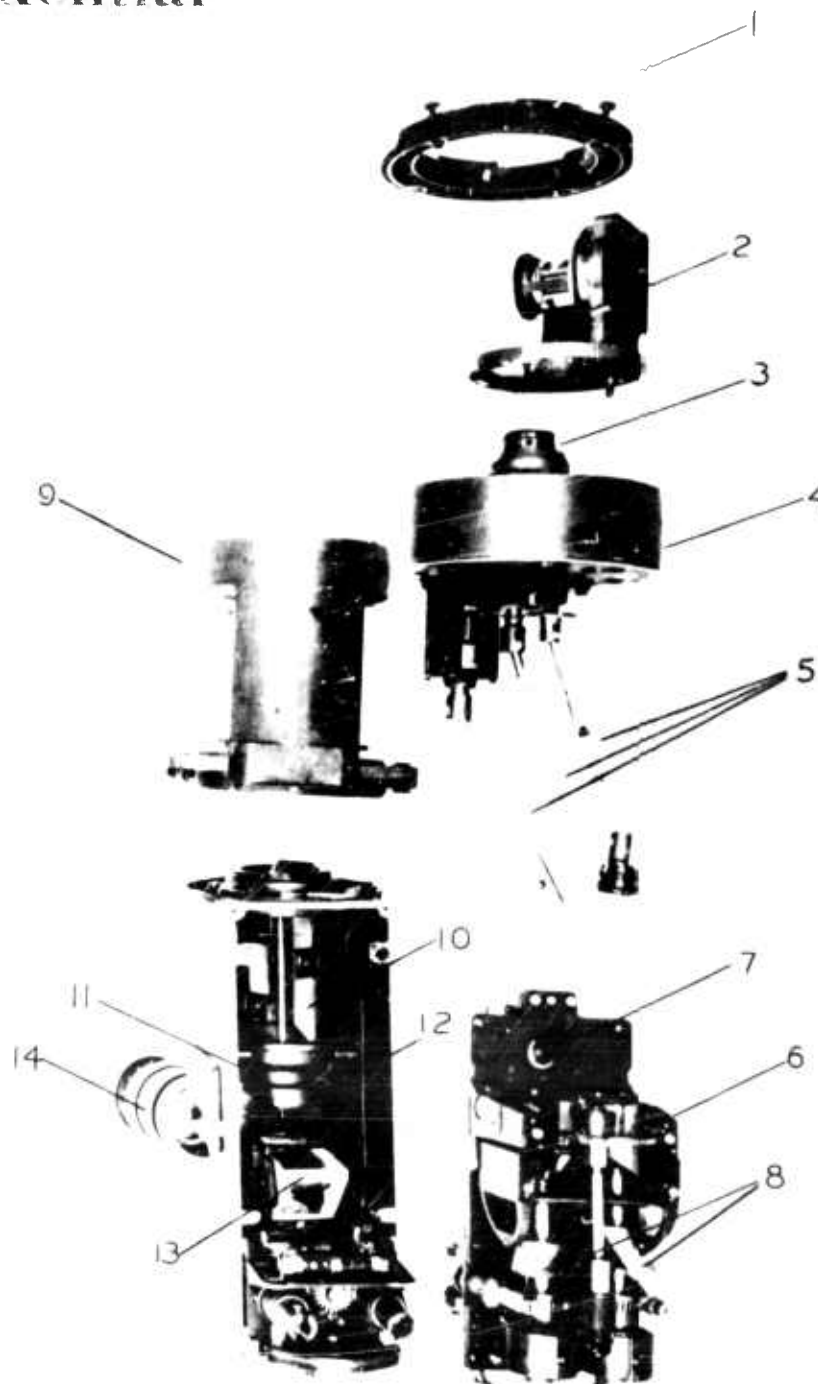


Figure 6. Exploded View (Rear)

- | | |
|-----------------------|---------------------------|
| 1. Dome | 8. Three Dimensional Cams |
| 2. Head Prism | 9. Housing |
| 3. Objective Assembly | 10. Dove Prism |
| 4. Gear Housing | 11. Filter |
| 5. Linkages | 12. Erector Lens |
| 6. Reticle Mechanism | 13. Ocular Prism Assembly |
| 7. Reticle | 14. Eyepiece Assembly |

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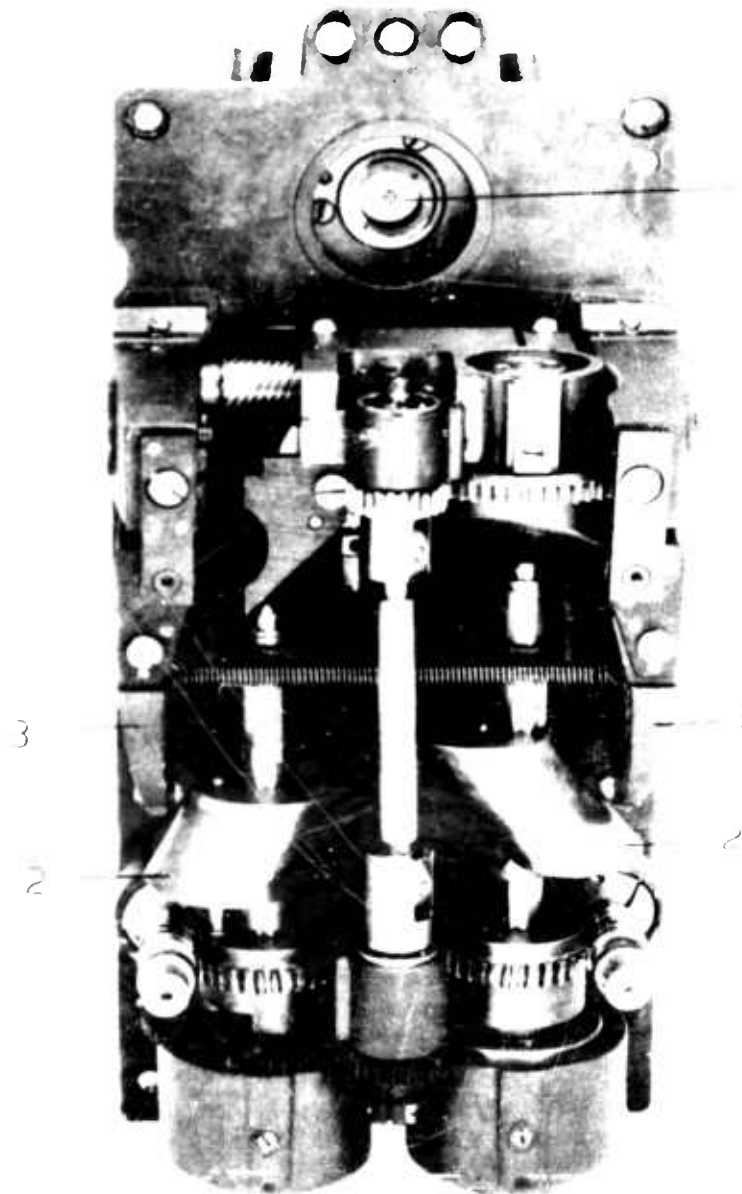


Figure 7. View of Reticle Mechanism

1. Reticle

2. Three Dimensional Cams

3. Cam Followers

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